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Assessment of a global eddy-permitting biogeochemical hindcast of the ocean colour era.

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The combination of climate change and various anthropogenic drivers, such as e.g. changes in external nutrient inputs and exploitation of marine resources drive important changes in marine ecosystems. These changes occur against the background of natural variability. The retrospective analysis of global ocean biogeochemical state holds promise for identifying the response of marine ecosystems and biogeochemical fluxes to natural climate variability and, potentially, allows to detect trends driven by global climate change. Ideally, such a biogeochemical hindcast simulation should resolve the mesoscale and span multiple decades. Here, we present a biogeochemical simulation at 1/4° resolution for the period between 1994 to 2010 with NEMO/PISCES. The biogeochemical model PISCES was forced off-line by weekly fields provided by a physical simulation at 1/4° resolution (orca025) over the same period. The model was initialized with global climatologies. The spin-up involved 20 years of biogeochemical off-line simulation forced by a climatology of ocean physics. The inter-annual simulation (1994-2010) followed on the spin-up. The analysis of our spin-up strategy is presented with focus on the adjustment of model fields. The inter-annual simulation is evaluated by systematically comparing model fields to observations at global and regional scales. We draw on EOF (Empirical Orthogonal Functions) analysis to evaluate spatial/temporal variability. We focus on links between biogeochemical and physical variables in order to identify underlying common modes of variability for multiple variables. Finally, to complete the assessment, we compare EOF modes for Globcolour chlorophyll estimates (a merged Seawifs-Meris-Modis product) and model output over the period of observations.